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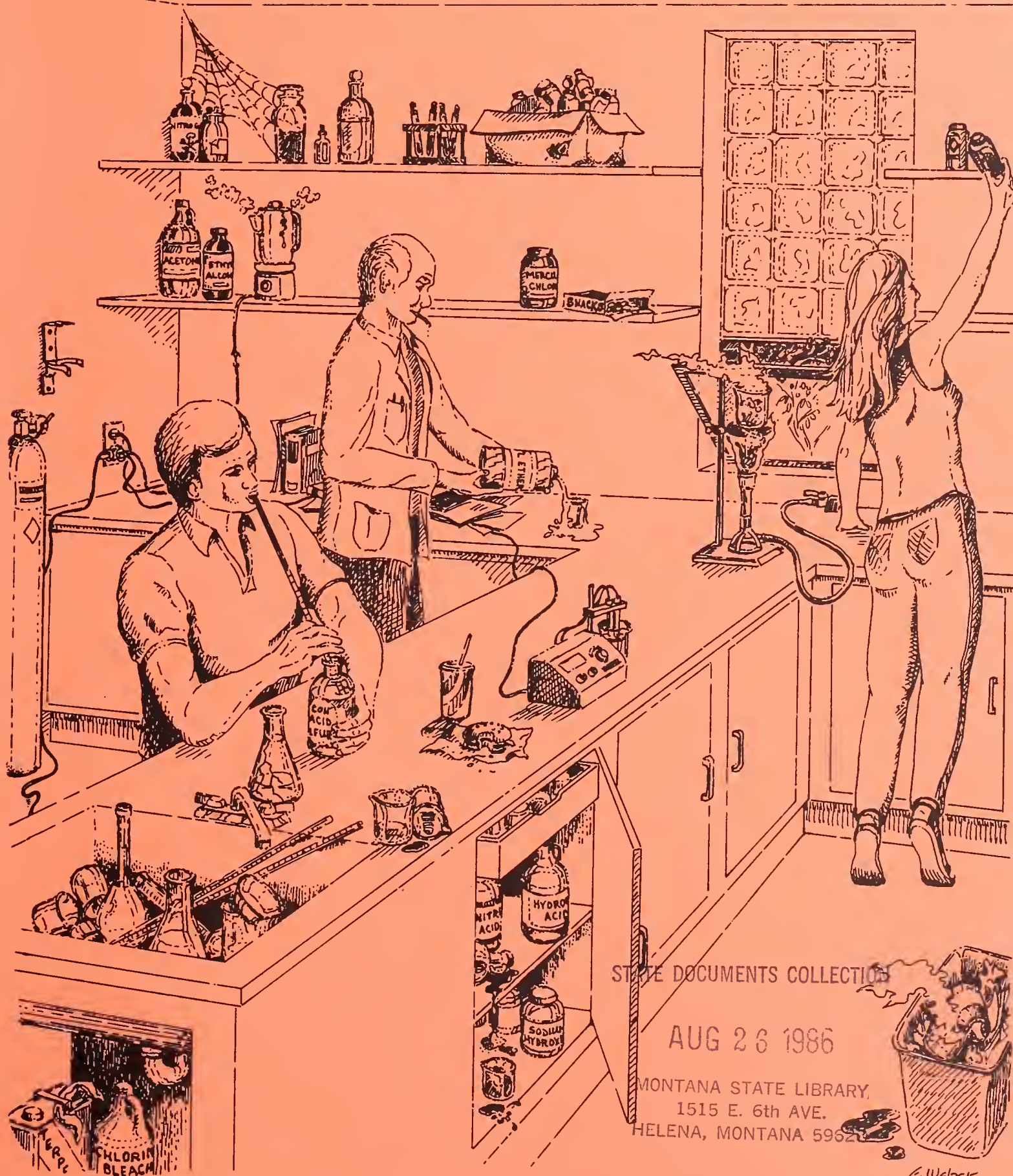


Big Sky PLEASE RETURN

Clearwater

Hazards Abound: Safety Awareness Important in Labs

FALL 1986



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Do you have an interesting story or information you would like to see in this publication? Contributions of articles for the Big Sky Clearwater are gladly accepted. Please call or write to us at the address below.

If you do not wish to continue receiving this publication please send us your name and address so that we can remove your name from our mailing list.

Rick Rosa
Water Quality Bureau
Dept of Health & Env Sciences
Cogswell Building
Helena, MT 59620



The Big Sky Clearwater--for water and wastewater-treatment operators across Montana--is published two times a year by

the Water Quality Bureau of the State Department of Health and Environmental Sciences in cooperation with the Montana Section American Water Works Association and the Montana Water Pollution Control Association.



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Lab Hazards Subtle

By: Jan Cranor. Billings Water Treatment Plant

"Hazards in a wastewater or water lab? How could there be any hazards? This lab is not much different than my kitchen." That is possible, but working in a lab could be more hazardous than cleaning out a digester (which may be as hazardous as cleaning out your refrigerator).

The cover of this publication illustrates many of the hazards and careless techniques that can be found in a lab. Take a few minutes to identify as many problems as you can. Then look at the list below to see how you did.

Hazards in a lab are sometimes obvious but more often are very subtle. Hazard awareness in the lab is every bit as important as hazard awareness when working around operating machinery or working in a trench. Please update the status of your awareness by reading through the list of hazards below and add your own ideas about problems which you have encountered. Remember that these concerns are applicable not only to lab personnel but also pertain to people walking through the laboratory area.

1. Protective clothing and equipment should be worn while working in a lab. A lab coat or apron, gloves, and safety glasses should be worn when performing lab tests (even if you think you look stupid) especially when using corrosive or other dangerous chemicals or substances.
2. Pipetting should never be done by mouth. Always use a safety bulb. A sip of sludge in the morning may not set well with your orange juice and toast!
3. Volatile chemicals should always be used inside an operating fume hood. Cleaning your still with concentrated hydrochloric acid while using ammonium hydroxide on the open counter top may cause you to be in a fog. (Remember the test for chlorine gas?)
4. Old and unmarked chemicals should be discarded. There is no market for antique chemicals.
5. Fire extinguishers and a fire blanket should be available and clearly marked.
6. A lab should be equipped with a working safety shower, eye wash and first aid kit.
7. Smoking, eating and drinking should not be allowed in a lab. Food, drink and hands can be contaminated too easily. Never use glassware as eating or drinking containers.
8. Chemicals (especially acids) should not be stored above eye level.
9. Non-compatible chemicals should not be stored close together. A container of calcium hypochlorite next to a leaking can of turpentine may cause more excitement than you need in one day!
10. Chipped and cracked glassware should be properly discarded or repaired. Rubber to glass connections should always be made using water lubrication and gloves.

11. Loose hair and clothing can also be a problem. Be particularly careful around hot plates and flames.
12. Housekeeping in a lab is important. Less obvious but more dangerous hazards include contamination of counters, cabinets, floor and sinks with wastewater or chemicals. A lab should be kept clean at all times and neatly arranged.

Of course, there are many other hazards in a lab. Always remember, while accidents in a lab are seldom fatal, they can occur quickly and be very painful and disabling. Safety awareness is a matter of choice. Be responsible!

Nominations Needed

Operator's Meritorious Service Award

AWWA MEMBERS! The Montana Section Awards Committee is asking for nominations for the 3rd Annual Operator's Meritorious Service Award. The award is to recognize special performance by operators for compliance with public health standards, plant maintenance, development of new ideas, training and outstanding achievement beyond normal operating responsibilities. Past recipients are Hugh Wilkins of Great Falls in 1985 and Leonard Willett of Helena in 1986.

Any member of AWWA can submit a nomination for this award. Please remember that your nominee must be an operator and a member of AWWA. If you would like to receive award criteria and an entry form, please contact:

Denise Ingman, Awards Chairman
Cogswell Building; A 206
Helena, MT 59620
444-2406

The nomination deadline is January 1, 1987. The award will be presented at the annual AWWA/WPCF Conference in March 1987 in Butte.

Digester Gadgetry

(For the "Dirty Water" Boys and Girls)

By: Tim Hunter, Hamilton Wastewater Treatment Plant

What do you do when you can't get supernatant out of your digester? This is the question operators at the Hamilton Wastewater Treatment Plant had to answer.

Operation of aerobic digesters is not always as simple as folks might think. Problems include: foaming, poor supernatant quality (for you non-wastewater types, supernatant is the "clear" water which appears at the surface of the digester after the sludge is allowed to settle) and lack of consistency in supernating. Just when you are depending on two feet of clear water to supernate, that is the time you'll get zip.

It becomes very important to get all the supernatant you can when it is available. Our aerobic digester tanks are equipped with telescoping valves which allow us to draw supernatant from the top three feet of the digester. This is fine but what do you do when the digestors are not filled to within three feet of the top? We also have two mud valves located at lower depths in the digestors which can be used for obtaining supernatant but the interface (place where sludge meets clear water: sludge below, water above) must be at exactly the correct elevation. This doesn't happen very often.

In an effort to alleviate these problems and to increase our supernating flexibility, we built a hoist. We mount the hoist above the digester and lower a portable gasoline powered trash pump into the digester to allow us to obtain supernatant wherever it is located within the tank. We just lower the suction end down into the supernatant, stick the discharge

hose in the top of the telescoping valve, start the pump and away we go. Why didn't we think of this sooner? This idea has greatly increased our flexibility and gotten us out of some binds when sludge storage was at a premium.

So remember, when you think there is no solution to a problem and you are cussing your engineers for not designing enough flexibility in your plant, stop and use your noodle. There may be a simple solution you can come up with on your own. Don't try to pat yourself on the back when you're done; you might twist your arm. Just send your idea in to the Big Sky Clearwater!



BY: Donna Howell, Water Quality Bureau

Establishment of 0.1 NTU as a Primary Drinking Water Regulation requires that it first be issued as a Recommended Maximum Contaminant Level (RMCL). While set as a RMCL, no system will be required to reduce the turbidity to 0.1 NTU. RMCL's serve only as health goals and are used as an initial step for the eventual establishment of an enforceable Maximum Contaminant Level (MCL). The MCL will be set as close to the RMCL as feasible, and will require compliance under the Safe Drinking Water Act.

At this point, the 0.1 NTU is only a proposed RMCL and the EPA has been accepting public comment. The AWWA has responded with the idea of establishing both turbidity and total coliform as performance operating standards and not as primary drinking water regulations. Their point is that neither turbidity nor total coliform are directly threatening to public health and should not therefore be primary drinking water regulations.

While the debate over this revised regulation continues, 1.0 NTU will remain the standard for surface water supplies. However, it seems reasonable to assume that this level will be reduced due to the false sense of security provided by the 1.0 NTU standard with regard to persistent health concerns such as viral and Giardia contamination.

By: Roy A. Wells, WQB

The town of East Farr-enuff, Montana is being sued by Mr. and Mrs. I.M. Litigious because of alleged injuries resulting from drinking the town's water. The suit claims that toxic materials leached from the interior coating of the town's water storage tank have caused them permanent disabilities and mental anguish.

The above story is not true and may be farfetched, but who knows what can happen? One town in Montana did have to wait three months to use their newly painted tank while the coating was being tested for toxicity.

The point of this article is to alert people to the importance of determining whether proposed coatings for tank interiors are safe for potable water. It is a simple thing to do. A telephone call (444-2406) or a letter to the Water Quality Bureau will do the trick.

Before contacting the bureau, the exact name of the proposed coating, its number and manufacturer should be obtained in writing from the contractor. Accurate description of the coating is essential because of the many coatings on the market with similar names. Inquiries will be checked against a lengthy list of EPA approved coatings.

Hydrant Maintenance

By: Dick Seevers, Mueller Company - (Reprinted from OPflow)

Fall will soon be here, and fall is almost sure to be followed by another Montana winter. Among the chores we need to do to prepare for winter is routine fire hydrant maintenance. Pre-winter maintenance is particularly important in our area.

Fire hydrant inspection

In most cases, the water utility is responsible for buying, installing, maintaining and repairing fire hydrants. The fire hydrant is a vital piece of the community's fire protection system and should be inspected at least twice a year to assure that it's always ready for immediate use.

The personnel who conduct your fire hydrant inspections should be thoroughly familiar with the design and operation of the various types of fire hydrants they will encounter. Don't hesitate to contact your supplier for instruction manuals, literature and assistance.

It would not seem unreasonable, particularly in smaller communities, to call on your fire department for some manpower assistance with these inspections. This will be an educational opportunity for those firemen who are unfamiliar with the construction and operation of this piece of fire fighting equipment.

Types of fire hydrants

Dry barrel fire hydrants are generally of three types. One is commonly called the "compression type." It closes with the pressure and opens against the pressure. The operating threads are located at the top, usually protected from the waterway by a packing of some type, and may be lubricated either manually or automatically.

Another type of dry barrel fire hydrant, the "Cory type," opens with the pressure and closes against the pressure. The operating threads are located at the bottom of the stem, opening and closing the main valve with a toggle joint arrangement.

A third type of dry barrel fire hydrant is the "gate type." It too, is operated by threads at the bottom of the stem and operates much like a gate valve.

Drains

All dry barrel fire hydrants have one thing in common--progressive drains. This means they do not open or close instantly, but operate progressively as the fire hydrant opens or closes. In general, it takes from three to five turns to completely close the drain. All of the people who may operate fire hydrants should be aware of this fact. A partially open drain, under full pressure, can soon saturate the drain field. This softens the support behind the "kick block" and could result in the fire hydrant blowing off of the lateral.

Inspection procedures

1) Remove outlet nozzle caps and check for water in the barrel. Water indicates either a leak in the main valve or high groundwater.

2) Check for main valve leakage with an aquaphone. It's possible to have a slight leak that's being handled by the drainfield.

3) For a compression type fire hydrant, determine if it's manually or automatically lubricated. A screw or fitting in the operating nut indicates manual lubrication. Check lubricant level and lubricate if necessary. A fill plug in the bonnet suggests a reservoir where automatic lubrication occurs. Check reservoir supply.

4) Replace nozzle cap and open hydrant all the way. In this balanced pressure situation, the hydrant should operate easily. If stem action is tight, exercise it by opening and closing it several times until the action is free and smooth.

5) With the nozzle caps on and the main valve fully open, check the various nozzle connections, caps and seals for leakage. If leakage is detected, tighten or recaulk outlet nozzles. Lubricate and tighten compression packing or replace O-rings (or similar seals) and gaskets. If leakage cannot be corrected with the tools on hand, record the nature of the leakage for prompt attention by those responsible for repairs.

6) Close the main valve to the position at which the drains open. "Power flush"--allow the water to flow through the drains under pressure for ten seconds. Fully close the valve and remove the nozzle cap. Observe the drain rate.

7) Flush the fire hydrant. This is best done through the pumper nozzle--the bigger the opening, the greater the flow and the more effective the flushing action. Use a hose or diverter. You'll often receive two "slugs" of dirty water. The first out of the hydrant leads the second out of the main.

8) Close the hydrant. Always be sure the last few turns are done slowly to minimize the possibility of water hammer. Observe the drain rate. If it's draining properly, you should feel a suction if you place your palm over an outlet. Don't tighten the last nozzle cap too soon or the inability to draw in air will retard or stop drainage.

9) Check again for seat leakage by aquaphone.

10) If your fire hydrants have permanently plugged drains because of high groundwater in your area, pump out residual water from the barrel.

11) Remove nozzle caps and inspect for thread damage or cross threading. Wire-brush the nozzle and cap threads. Clean and lubricate the outlet nozzle threads. (A dry graphite base lubricante works well.) Check for ease of operation. Also, check to see that nozzle cap gaskets are in good condition.

12) Check for free action in cap chains. If chains bind, open the loop around the cap until action is free. This prevents kinking during emergencies.

13) Replace nozzle caps. Tighten with spanner wrench, then back off slightly so caps aren't too tight.

14) Lubricate operating nut threads. Check manufacturer's instructions on this.

15) Be sure the gate valve ahead of the hydrant is fully opened.

16) Clean the exterior of the fire hydrant. Now is a good time for repainting if needed.

17) Tag all inoperable fire hydrants. Report them to your fire department and request scheduled repairs or replacements to prevent time loss in emergencies.

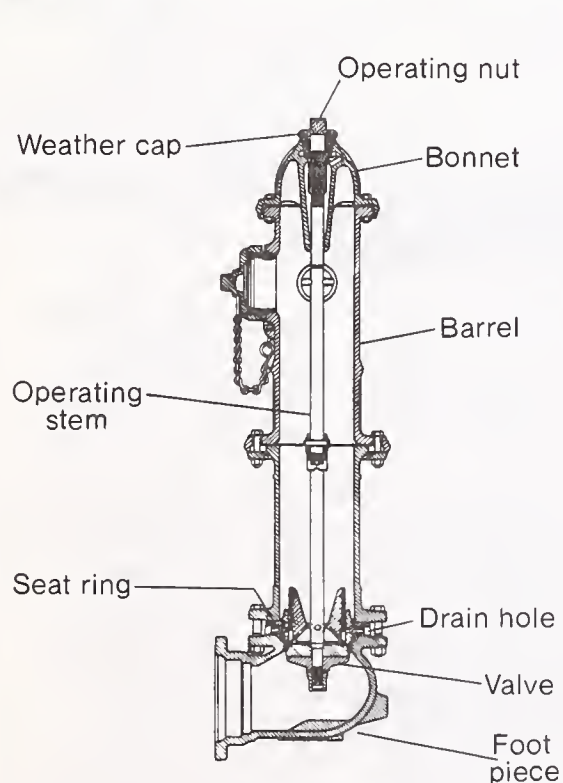
18) Keep a record of your inspection and any repair work performed. Most manufacturers have cards available for this purpose.

Other things to consider

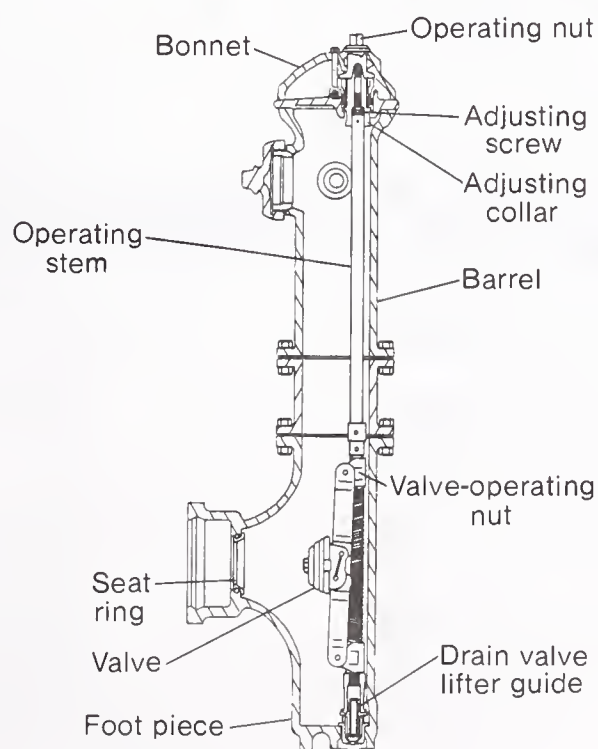
Fire hydrants should be set to the proper grade but such grade may change. All hydrants seriously above or below grade should be adjusted accordingly. All manufacturers offer extensions and shorter sections of various lengths.

A basic stock of repair parts should be maintained and available for immediate use. This reserve of parts should include main valves since they seem to be the most frequently replaced part on a fire hydrant. Other important items are drain components, seat rings, oil for refilling reservoirs, stem seals or packing and "traffic damage" repair kits. These parts should be stocked for the various types and sizes of hydrants in your system. The quantity of parts you will need can best be determined by your experience.

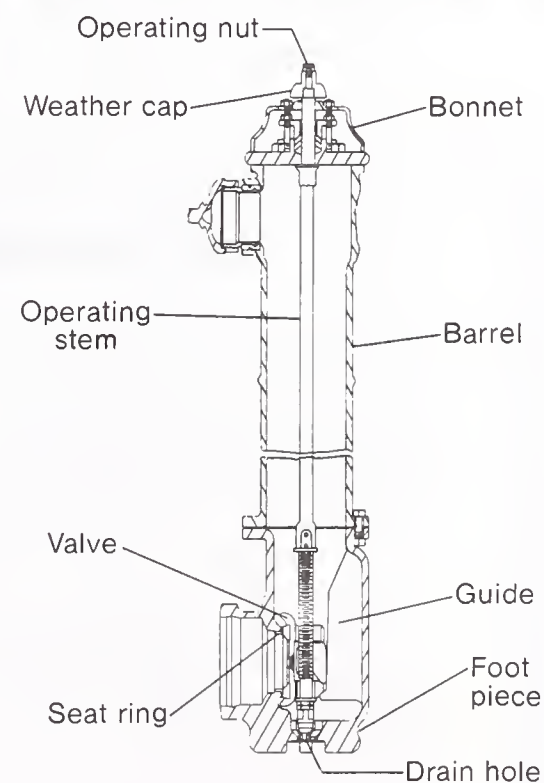
A good reference for routine inspection and maintenance procedure is contained in AWWA Manual M-17 "Fire Hydrants--Installation, Operation and Maintenance."



Compression



Cory



Gate

Injury Rates Up

By: Robert Klausegger, Member
Illinois WPCA Safety Committee

A safety survey conducted by the Water Pollution Control Federation concludes that the overall injury frequency rates for wastewater systems nationwide increased during 1984. The 1984 rate marked the second consecutive year that the injury frequency rate among collection systems increased. The rate increased 16 percent from 67.37 in 1983 to 78.20 in 1984. Of the 1,267 systems nationwide that reported in the survey, only 60 percent indicated they had a safety program.

Reported 1984 fatalities were three in treatment plants, one in collection systems and one in the combined systems. There were 3,010 disabling injuries. Ohio ranked highest with 318 injuries among 132 systems reporting, California reported 310 among 60 systems, and Illinois reported 250 among 61 systems reporting.

The WPCF has conducted a safety survey since 1967. Results consistently reveal poor safety performance. Billions of dollars have been spent to design, construct and operate treatment systems, yet it appears that little is being spent for safety equipment and safety training. The result has been increased insurance rates, faulty operation and maintenance, lost productivity and equipment downtime, litigation, injuries and death! Public officials, facility management and employees, designers, manufacturers and suppliers must share this blame and can no longer afford to be complacent amid the public sensitivities over health and safety issues.

The highlights from the safety survey include:

- injury rates for collection systems continue to increase;
- wastewater injury rates are almost five times the nationwide industry average;
- ten percent of the wastewater work force experienced a disabling injury;
- strains, wounds and sprains accounted for 80 percent of all injuries;
- unsafe work procedures, improper or faulty design, and hazardous conditions or atmospheres were major contributing factors for disabling injuries;
- widespread availability of formal safety programs has not resulted in a commensurable decrease in injury rates.

It should be noted that implementing an effective safety program at a facility does not mean a reduction in the number of injuries reported. The key word is "reported". Without a safety program and a clearly defined routine in treating and reporting, minor injuries may be unnoted. Under an effective safety program, all injuries, no matter how minor, must be treated and reported. The number of injuries may not actually increase, but the number "reported" may increase on a paper record, indicative of an effective safety program participated in by all operators and workers.

(Taken from a publication put out by the Illinois Environmental Protection Agency and the State of Illinois - Digester/Over the Spillway?).

Another Trenching Accident

Once again there has been a trenching accident in Montana. This is a good time to remind everyone of the article on trenching safety in the last issue of the Clearwater (Spring, 1986). Perhaps those of you in the trenches may want to read or review this information so that trenching safety is a number one priority item at your place of business. If you should have any doubts about the danger involved with working in a trench, please read the following description of the recent accident.

On the morning of Friday, March 21st, work was resumed on a new water service installation. A sewer service had been completed the day before, but, as is typical in a small community, unforeseen problems precluded completing the water installation on Thursday as was originally planned.

The main had been uncovered and the contractor was doing some shovel work around it when part of the ditch sloughed off behind him. Additional digging was necessary to once again expose the main and allow for a visual inspection of the ditch walls for flaws and loose material. Having completed the inspection, the city water system operator entered the ditch. He was in the process of hooking up the tapping machine to the main when a worker at street level yelled that the ditch was caving in. The water operator had almost reached a standing position when he was hit in the left side by a slab of dirt approximately 4' x 7' x 8-12' thick. The estimated weight of this material was in excess of 1000 pounds.

The local volunteer ambulance service was called and responded within 5-10 minutes. The water operator was in a partially upright position near the back of the ditch and he had been covered to the knees in loose material. The ambulance crew immobilized him because of the probability of spinal and pelvic injuries and took him to the nearest hospital, about 30 minutes away.

Unfortunately, the main slab had remained intact until it struck him. At the hospital it was discovered that he had suffered five pelvic fractures, a dislocated shoulder, fractured ribs, severe bruises and abrasions and other internal injuries. He was hospitalized for sixteen days and is now home recuperating. The initial prognosis was for a minimum of six months recuperation time.

MSAWWA/MWPCA Conference

MSAWWA/MWPCA Conference to be held
in the Butte Copper King Inn on
March 25, 26, and 27, 1987

Plan now to attend! In addition to the seminars, discussion and product display areas, an interesting contest will be featured at this conference. Bring a 1/2 gallon container of water from your city, town, district or association water system supply and we'll find out on Thursday who has the best tasting water in the state.

Registration Fees are as follows:

Member \$75, Spouse \$25, Non-member \$90 (fee to include membership in either AWWA or WPCF for one year)

****Preregistrants will receive special prizes in their packets****

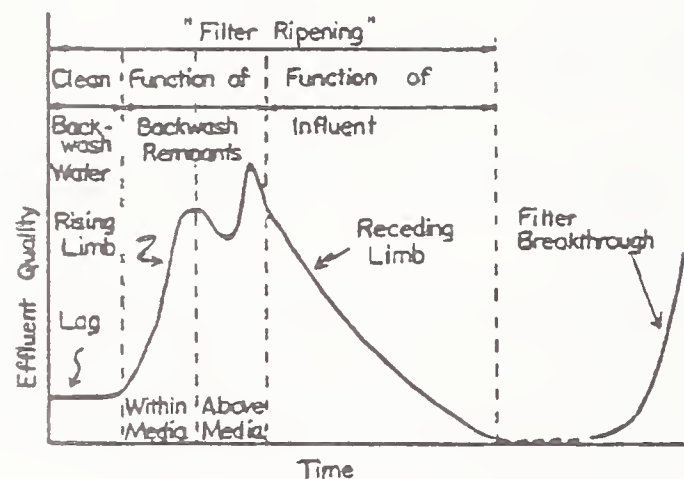
Rooms are available at the Copper King Inn (494-6666) for \$40 single occupancy and \$46 double.

SEE YOU IN BUTTE IN THE SPRING.

Filter to Waste Cycle Researched

By: Denise Ingman, Water Quality Bureau

Typically, the initial quality of effluent from a granular media filter following backwash is poor. This initial degradation period is sometimes loosely referred to as "filter ripening". A. Amirtharajah, of Montana State University, and his associates have shown that the poor quality water peaks occurring during this period are chiefly caused by the backwash water remnants within and on top of the filter and that they are intrinsic to a repeatedly used filter. Following the initial degradation that is linked to the backwash water remnants, there is also an improving phase of effluent quality due to the increasing capture efficiency of the filter from retained particles that occurs over some time during the run (see graph below). These studies indicate that most of the particles that pass through a filter do so during the initial degradation period.



CHARACTERISTICS OF INITIAL EFFLUENT QUALITY

The significance of this whole phenomenon has resurfaced partly because of the problem of giardiasis facing the water supply industry. Studies have shown that Giardia cyst concentrations may be higher than usual during the first portion of a filter run and that small increases in turbidity are often associated with increases in Giardia cyst concentrations. Since ingestion of a small number of cysts has caused infection, it is indeed possible that the initial degradation phase of filtration can transmit sufficient cysts to cause the disease even in an otherwise well-operated plant. Additionally, EPA is proposing a Recommended Maximum Contaminant Level (RMCL) for turbidity of 0.1 NTU. Meeting the reduced turbidity standard may require filters to be designed and operated with a filter-to-waste cycle at the beginning of each filter run.

Because there is, in particular, a scarcity of plant scale data available in determining the significance of Giardia transmission during initial degradation and because there are so many other unanswered questions regarding initial degradation, MSU competed for and was successful in obtaining funding from the AWWA Research Foundation to collect and study data from two Montana water treatment plants. The selected sites are the direct filtration plant in Bozeman and the conventional treatment plant in Helena. In conjunction with these plant scale studies, a simulation and pilot plant study is being conducted with funding from the MSU Engineering Experiment Station at Bozeman. The combination of these studies should provide valid answers to the following objectives set by principal investigator, Dr. A. Amirtharajah, and graduate student, Karen Bucklin:

1. To confirm the occurrence of high turbidity, bacteria and other particles in the initial effluent from a filter and its association with the backwash remnants.
2. To compare the magnitude of the two components of initial degradation: backwash waster remnants vs. the improving phase.
3. To determine the severity of initial degradation in relation to current standards for drinking water (1 NTU and a possible future standard of 0.1 NTU).
4. To determine the changes in initial degradation over seasonal changes in raw water quality including temperature and treatment chemicals.
5. To compare initial degradation within a conventional plant vs. a direct filtration plant.
6. To develop design and operational guidelines to minimize the detrimental effects of initial degradation.

While this research project will not be completed and a final report available until March 1987, operators at both the Bozeman and Helena treatment plants are happy to be involved and are learning a lot of important information about their systems. Leonard Willett, chief operator at the Helena plant, describes below how he and his operators are participating in the data collection for the project. In the next issue of this newsletter, we will follow up on the results of the research and hear what Bozeman has learned from their part of the project.

Helena Participates in Research Project

By: Leonard Willett, Chief Operator, Helena

The Missouri River Treatment Plant (M RTP) is a 10 MGD conventional treatment plant providing water to at least half the City of Helena during the summer and to three-quarters of the city in the winter. The plant has the ability to operate in the direct filtration mode and is used that way during periods when algae is not a severe problem. There are eight multi-mix media filters each having the capacity to filter 1.75 MGD. Treatment chemicals used include aluminum sulfate, cationic polymer, carbon, nonionic polymer (as a filter aid) and chlorine.

Equipment purchased for the project included a low-range, instantaneous-reading turbidimeter built on a stand, a continuous chart recorder, and miscellaneous plumbing materials for connecting the turbidimeter to the effluent piping. This portable instrumentation can be hooked up to any of our eight filters for continuously monitoring the filter effluent during a filter run.

The sampling procedure consists of two parts as described below:

1. The turbidimeter is hooked to a filter and effluent quality is monitored for the duration of the run.

2. At the same time that the filter effluent is being continuously monitored, grab samples are also collected and monitored on a bench-model turbidimeter. Because the recorder gear turns too slowly to see the peaks (scale of 1 inch per hour) this type of grab sampling allows a more accurate graph of the data to be made. (Note: Since the first writing of this report, a replacement gear has been obtained for the recorder with a much expanded scale of 1 inch per minute, allowing each turbidity peak to be recorded.) The grab sampling schedule is as follows:

- (1) A sample is collected immediately following filter backwash, just as filtering is resumed.
- (2) One sample is collected every five minutes for a period of 15 minutes. During this first 15 minutes at our plant we are seeing the treatment of the backwash water that was contained within and on top of the filter media. After 15 minutes, filtration of chemically, pretreated raw water begins.
- (3) After this 15 minute period, one sample per minute is taken for an additional 15 minutes, adding up to 30 minutes of filtration time at this point.
- (4) From 30-60 minutes, samples are collected every 5 minutes. Once again, these results are compared to the results obtained on the in-line, continuous recorder.

Although the data collection for this project will continue on for quite some time yet, and adjustments to the chemical pretreatment, sampling schedule, etc. are to be made periodically, we here at the Helena plant have already gained considerable information that will benefit our operational processes. By closely monitoring the effluent turbidity, the operators can readily see the effect a rate adjustment has on the filters. Of particular interest, we were able to see the effects of slowly opening the filter effluent valve compared to opening the valve all at once to the desired rate. When the valve was opened in small increments the effluent quality deteriorated very little. The turbidity of the finished water produced at the MRTTP averages between 0.1-0.15 NTU, rising to 0.18-0.20 NTU during the filter ripening period when the effluent valve is opened slowly. When the filter was "shocked" by rapidly opening the valve, the turbidity jumped as high as 0.25-0.30 NTU.

I would hope that through this project and our experience, all water treatment plant operators will come to understand the importance of continuously monitoring filter effluent quality. Experimentation with chemical dosages and operating procedures may greatly improve your overall filtered water quality and this is accomplished simply by setting a goal of what you want your filters to do and then monitoring them so you know exactly what each is doing. The time and effort expended by the operators is largely outweighed by the benefit of being able to serve your consumers a safer and better quality product.

If any operators would like additional information on filter effluent monitoring or other operational assistance, feel free to call me, Leonard Willett, at the MRTTP in Helena at 443-2381 or Denise Ingman with the Water Quality Bureau at 444-2406 and we will be happy to assist you in any way we can.

Continuing Education Credits Required

On July 9, all Class 1-4 operators who have renewed their certification for 86/87, were sent information on the new continuing education requirements. This information was accompanied by a copy of the continuing education regulation effective 7/1/86 and a copy of a Continuing Education Credit (CEC) report form. Operators-in-training and Class 5 operators have no continuing education requirements for renewal of certification.

The annual Operators' School in Bozeman (September 29-October 2) was recently approved at 2.5 credits for those attending the full 25 contact hours of the school. Partial credit may be earned by attending selected classes at the school. Seminars as offered in the past by the Montana Rural Water Association and the Joint Education Committee of the AWWA/WPCF will be approved for the number of contact hours represented by each course. Northern Montana College is offering a lagoon course which was approved for 1 CEC and "Foundations of Wastewater Treatment Processes" approved for 4 CEC's.

Correspondence courses from Michigan State University and Sacramento (CSII) have been approved for 6 CEC's. The City of Helena sponsored a chlorine safety course for all its operators which was approved for .3 CEC. The department encourages course offerings from a variety of sources including in-house training, manufacturers' instruction courses, and applicable correspondence courses. Inquire about CEC credit approval procedures for such offerings by calling the certification office.

Montana joins 23 other states in requiring continuing education for renewal of certification for its water/wastewater operators. Over half the licensing programs in Montana now require continuing education for renewal of licenses or certification. Continuing education is a needed stimulus for encouraging good work by knowledgeable operators and will insure the most efficient and effective operation of water and wastewater facilities.

Cranor Resigns

By: Scott Anderson, Water Quality Bureau

Cranor says "Just take the sludge and shovel it--I ain't working here no more."

Jan Cranor, honorary member of the Select Society of Sanitary Sludge Shovelers and employee of the Water Quality Bureau, has given up his career as a sewage man. Cranor, after working over six years with the Water Quality Bureau as a training officer and environmental specialist, has accepted a job in Billings as assistant superintendent of the water treatment plant. While Jan is known to be quite knowledgeable in areas of wastewater treatment, his expertise in water treatment has not yet been established. His recent inquiry to the bureau on how to handle sludge bulking in the filters at the water plant has generated some concern.

In all sincerity, we at the Bureau wish Jan the best of luck in his new position. His good nature and practical experience with wastewater treatment will be missed.

Dick Pedersen has assumed Jan's position at the Water Quality Bureau. Dick has worked with the Permits Section of the Bureau for many years and is approaching his new job with enthusiasm.

Unique Training Experience

53rd Annual Operators School

Dates: September 29 to October 3
Place: Strand Union Building, Montana State University, Bozeman
Registration: 8:00 to 9:30 a.m. on September 29 (no preregistration)
Cost: \$50 (payment to MSU)
CEC's: up to 2.5

We are pleased to announce the fifty-third annual operators school to be held from September 29 to October 3, 1986 at Montana State University in Bozeman, Montana. This year's school will include topics presented by nationally-known experts complimented by sessions giving Montana's own experiences. In addition to the general sessions, sessions for operator study (SOS) have been scheduled. The SOS will offer individual instruction in solving math, chemistry and hydraulic problems encountered in the day-to-day operation of water and wastewater systems. All of the sessions will be of great help to those planning to take the Operator's Exam on Friday, October 3 or at other scheduled times throughout the year.

The operator certification exam is administered separately from the Operator's School. You do not have to take the exam if you attend the Operator's School, nor do you have to attend the Operator's School in order to take the exam. However, you should find the exam much easier after four days of intense study at the school. If you wish to take the exam, you must contact Rosemary Fossum, DHES, Water Quality Bureau, Cogswell Building, Helena, MT, 444-2691. (See the examination notice elsewhere in this issue.)

As a reminder, attendance at the Operator's School will satisfy the continuing education credits required over the next two-year period for all operators. (See CEC article elsewhere in this issue.)

This year's registration fee is \$50. Checks and purchase orders should be made out to Montana State University and be brought to the school; there is no preregistration. This year's school will be held in the Strand Union Building (SUB). Because university classes will have already begun, we will not be able to arrange on-campus housing for school participants. Therefore, each person will have to make his/her own arrangements for lodging and meals.

We are expecting an informative, useful and exciting school this year. Hope to see you there!

For further information contact:

Denise Ingman or
Dick Pedersen
Water Quality Bureau
Department of Health and
Environmental Sciences
Cogswell Building
Helena, MT 59620
444-2406

Howard Peavy
Water Resource Center
309 Montana Hall
Montana State University,
Bozeman, MT 59715
994-6690

PRELIMINARY PROGRAM

MONDAY, SEPTEMBER 29

Morning

- 8:00 Registration
- 9:30 Welcome - Dave Gibson, MSU
Response - Steve Pilcher, WQB
Operator Certification - Rosemary Fossum, WQB
Continuing Education Requirements - Don Willems, DHES
- 10:15 Break
- 10:45 Communications: How to Talk to Your Elected Officials
Ken Weaver, MSU
- 11:45 Lunch

Afternoon

Session I - Water Operators

- 1:00 Water Treatment Processes and Operations -
A. Amirtharajah, Georgia Tech
- 2:30 Break
- 2:45 Water (continued)

Session II - Wastewater Operators

- 1:00 Wastewater Treatment Processes and Operations -
Dick Pedersen, WQB and Jan Cranor, Billings
- 2:30 Break
- 2:45 Chlorination - Ken Johnston

Joint Session

- 4:30 Session for Operator Study (SOS)
- 7:00 Wine and Cheese Social - Hosted by AWWA and WPCF

TUESDAY, SEPTEMBER 30

Morning

Session I - Water Operators

8:00 Chlorination - Ken Johnston
10:00 Break
10:30 Iron and Manganese: Occurance, Treatment and Associated Bacterial Problems
11:45 Lunch

Session II - Wastewater Operators

8:00 Lagoons - Doris Roberts, NMC
10:00 Break
10:30 Iron and Manganese: Occurance, Treatment and Associated Bacterial Problems
11:45 Lunch

Session III - Wastewater Operators

8:00 Sludge Settling Problems: Causes and Cures - Paul Klopping, Environmental Training Consultants, Corvallis, Oregon
10:00 Break
10:30 Sludge Settling Problems (Continued)
11:45 Lunch

Afternoon

Session I - Water Operators

1:00 Water Filtration - A. Amirtharajah
3:00 Break
3:15 Total Coliform Sampling and Analysis - Denise Ingman, WQB and Janet Baker, Microbiology Laboratory
4:30 SOS

Session II - Wastewater Operators

1:00 Wastewater Laboratory: Procedures, Safety, and Quality Assurance
3:00 Break
3:15 Wastewater Laboratory (Continued)
4:30 SOS

Session III - Water Operators

- 1:00 Wells: Drilling, Development, Maintenance and Operation - Henry Johnson, Montana Rural Water Systems, Inc.
- 3:00 Break
- 3:15 Total Coliform Sampling and Analysis - Denise Ingman, WQB, and Janet Baker, Microbiology Laboratory

WEDNESDAY, OCTOBER 1

Morning

Session I - Water Operators

- 8:00 Your Responsibilities under the Safe Drinking Water Act - WQB
- 8:30 Water Rate Structures - Ray Wadsworth, Montana Rural Water Systems, Inc.
- 10:00 Break
- 10:30 U.V. Disinfection - Sam Watson, Fort Benton
- 11:45 Lunch

Session II - Wastewater Operators

- 8:00 You and Your Discharge Permit - WQB
- 10:00 Break
- 10:30 Gimmicks to Make Life Easier at Your Plant - Tim Hunter, Hamilton
One Community's Approach to Sludge Handling -
Fred Wendt, Silver Bow Metro
- 11:45 Lunch

Session III - Water and Wastewater Operators

- 10:30 SOS
- 11:45 Lunch

Afternoon

Joint Session - Water and Wastewater Operators

- 1:00 Distribution and Collection Systems - Tapping, Maintenance, etc. Dick Seevers, Mueller Co.; Dan Kandilas, City of Great Falls
- 3:00 Break
- 3:15 Tapping Contest - AWWA
- 4:30 SOS

THURSDAY, OCTOBER 2

Morning

Joint Session - Water and Wastewater Operators

8:00 Pumps, Seals and Packings - Jim Duke, Montana Seals and Packing
10:00 Break
10:30 Microbiology for Water and Wastewater Operators
Martha Dow, NMC
11:45 Lunch

Afternoon

Joint Session

1:00 Trenching Safety
2:00 Giardia - Donna Howell, WQB
3:00 Awarding of Certificates
3:15 School Ends!
3:30 SOS

FRIDAY, OCTOBER 3

8:30 Certification Exam

Anderson Receives Scholarship Award

Phillip Anderson, who is attending Northern Montana College (NMC), was this year's recipient of the MWPCA/MAWA Scholarship Award. Anderson is currently finishing his Associate Degree in Water Quality at NMC. He has a temporary appointment as a hydrologist for the Bureau of Reclamation in a joint effort with the Department of Natural Resources and Conservation, the Soil Conservation Service and several of the farmers in Blaine County to study irrigation water shortages on the Milk River project. This study should help improve water management practices and improve water quality by the reduction of nitrate fertilizers being leached from the soils into the Milk River through over-irrigation and excessive runoff from the fields.

Phil has worked in the water well drilling business since 1974. He received his contractor's license in 1979 and operates his own drilling business. Being involved in this business has given him an awareness of water pollution problems. "I hope to be employed in a position where I can help continue to conserve and better the quality of this great natural resource."

Phil would like to thank the Montana WPCA and the Montana AWWA for selecting him to receive the award; "The scholarship will, without a doubt, be of great help in furthering my career in the field of Water Quality Technology."

Examination Notice

ON FRIDAY-----OCTOBER 3, 1986-----8:30 A.M. TO 12:30 P.M.

IN BALLROOM B, STRAND STUDENT UNION BUILDING, MSU CAMPUS, BOZEMAN, MONTANA

examinations for certification as a Water Distribution Operator, Water Plant Operator, and Wastewater Plant Operator will be administered.

The examinations will be given at the conclusion of the annual Water School to be held on the MSU campus September 29-October 2. Attendance at the school is not required in order to take a certification examination. However, anyone planning to take an examination should complete a certification application AND examination registration slip before September 19, 1986, and send it to:

Water/Wastewater Operator Certification
Water Quality Bureau - Room A206 - Cogswell Building
Helena, Montana 59620 (Phone: 444-2691)

Annual fees for fiscal year 86/87 payable with application are: Class 1-\$27; Class 2-\$22; Class 3-\$17; Class 4-\$12; Class 5-\$10. There is no pre-registration for Water School. Fees for the school are payable to MSU at the time of registration September 29, early a.m. Water School information will be in the August CLEARWATER.

Those who have previously submitted certification applications and fees for fiscal year 86/87 will only need to submit EXAMINATION REGISTRATION SLIPS (detachable below) with a fee of \$5 per examination. PLEASE RETAIN THE UPPER PORTION OF THIS NOTICE to know the time and place of the examination. Checks should be made payable to: DHES - OPERATOR CERTIFICATION. For application materials or information contact the address or phone listed above.

EXAMINATION REGISTRATION SLIP

(Detach and return with \$5 per exam by 9/19/86)

I will take the examination(s) I have checked below:

<u>Type</u>	<u>Class:</u>	1	2	3	4	5
Water Distribution (A)		_____	_____	_____	_____	_____
Water Plant or Well (B)		_____	_____	_____	_____	_____
Wastewater Plant (C)		_____	_____	_____	_____	_____

*Combination examinations are offered for 2A3B, 3A4B, 4A4B, and 5A5B and require \$5 examination fee remittance only.

NAME: _____ ADDRESS: _____

Tapping Contest at Operator's School

Hard hats and jeans will be the required dress when tapping teams from Montana communities and water districts kick off the First Annual Tapping Contest at this September's Operators' School beginning September 29th.

Each community or water district is invited to sponsor a team to compete in this test of competence and coordination. The winning team will have the opportunity to represent the Montana Section of AWWA at the national tapping contest at the annual conference in Kansas City in 1987.

Dick Seevers of the Mueller Company will lead off the contest with a brief demonstration of proper tapping methods. Any school attendees not wishing to participate in the contest will still have the opportunity to make a tap at the completion of the contest.

Northwest Pipe Company of Billings, Montana will supply corporations, curb stops and meter yokes. The City of Great Falls will supply the ductile iron pipe ready for tapping, the tapping machine and other tools. Contestants should bring their own work gloves, hard hats and safety goggles.

Rules for the competition are as follows:

- A three person crew will drill and tap a ductile iron water main, above ground, under pressure with a Mueller B-100 machine; install a 3/4 inch corporation stop, 8 feet of 3/4 inch copper tubing, a curb stop and meter yoke assembly. (All equipment provided.)
- Crews shall cut and flare each end of the copper for connection to the corporation, curb stop and meter yoke. Four flares will be required.
- Tapping machines will be hand cranked. A standard 18-inch ratchet and a single bar will be provided to crank the tap machine. The same bar shall be used to make the tap and install the corporation stop.
- New drill bits will be provided for each team.
- 10 seconds for each leak, and 15 seconds for each safety violation will be added to each team's elapsed time.
- The crew completing the tap and assembly in the least total time, including penalties, will be the winner.

Some communities may have difficulty in allowing three men to attend. Utilities are encouraged to contact the contest committee and provide input on this matter. If many communities are unable to send three man crews, contest rules may be altered to allow two man crews or to allow combined efforts from operator school participants.

Interested parties should contact: Lyle Meeks, Great Falls (453-5478)
Mike Patterson, Butte (782-9021)

FOR SALE

- 88 yc Jacuzzi submersible well pump
- 75 hp three phase 460 volt motor
- 147 feet sch. 80 drop pipe
- 170 feet submersible cable
- 1 six-inch 90° galvanized elbow
- 1 six-inch check valve
- 75 hp three phase 460 volt control panel

price \$11,500.00

Contact

Stanton Cooper
880 Sleeping Child Road
Hamilton, MT 59840
phone: 363-3838

Amirtharajah's Efforts Win Recognition

Portions reprinted from the Department of Civil Engineering and Engineering Mechanics Newsletter - Montana State University (Winter 1986)

While on leave from the CE&EM Department, Dr. Appiah Amirtharajah continued to receive honors and awards for his research efforts.

This past fall, Amirtharajah was selected from national competition as one of ten environmental scientists and engineering fellows to work as a special research consultant with the Environmental Protection Agency. For the MSU professor, the ten-week assignment in Washington, D.C., centered on development of variance criteria for filtration treatment of drinking water. The results of the work will be incorporated in national regulations particularly relevant to large urban areas.

Amirtharajah was the recipient of the 1985 American Society of Civil Engineering Rudolph Hering Medal for his environmental engineering paper "Fundamentals and Theory of Air Scour."

The medal was instituted and endowed in 1924 by ASCE's Sanitary Engineering Division (now the Environmental Division) in honor of Rudolph Hering, past Vice President of the Society. The medal is awarded annually to authors, who are ASCE members, for original papers

dealing with water works, sewerage works, drainage, refuse collection and disposal or any branch of environmental engineering.

Amirtharajah's paper deals with air scour--the combination of water and air to clean sand filters in water treatment plants. Air scour has been used for several years throughout the world, but little is understood of the mechanics of the process nor have mathematical models been developed to aid in filter design. The paper presented an original theoretical analysis of the mechanics of air scour. Concepts in soil mechanics, porous media hydraulics and fluidization were combined to explain the complex flow patterns which emerge when air and water flow through the media.

In addition to the above-mentioned awards, he was also the recipient of the American Water Works Association's 1985 Academic Achievement Award.

Dr. Amirtharajah was a professor of civil engineering and engineering mechanics at Montana State University in Bozeman for several years. We understand that he recently accepted a position with Georgia Tech. He will be sorely missed by his friends in the State of Montana and we want to wish him the best of luck.

Dear Fellow Water Quality Professionals,

I would like to thank you for the hospitality shown me during my recent visit to your State during the joint meetings of the Montana Water Pollution Control Association and the Montana Section American Water Works Association. It was a pleasure to meet so many of you and to learn of the significant contributions you are making to our profession. I encourage you to keep up the good work.

Beth Turner
Vice President
Water Pollution Control Federation

AWWA/WPCA Committees

SEPARATE COMMITTEES

AWWA

Membership

Clint Tinsley - Co-Chairman
Dorina Howell - Co-Chairman
Mike Richards

Constitution and By-Laws

Mike Thomas - Chairman

Honors and Awards

Denise Ingman - Chairman
Mike Richards
Paul Torok

WPCA

Membership

Rod James - Co-Chairman
Diane Davison - Co-Chairman
Dick Pedersen - PWOD contact

Constitution and By-Laws

Ray Armstrong - Chairman

Honors and Awards

Deanna Anderson - Chairman
Tim Hunter
Ray Armstrong

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Jerry Eastmark
Jim Kaercher
Jan Cranor
Paul Torok
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Joe Steiner
Bob Millions

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Rick Appleman - Chairman
Phil Butterfield
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Rick Rosa - Chairman
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Leonard Willett
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Deanna Anderson
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Rod James
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Kristi Kline
Dick Montgomery
Craig Brawner
Jim Melstad
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Charlie Dickert - Chairman
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Tim Berry - Chairman
Ralph Dunahoo
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Bob Sanks
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George Fuller Award

Ken Beven - Chairman
Richard Nisbet
Mike Thomas
Amit Amirtharajah
Willis Wetstein
Ken Johnson

MWPCA Activities

Kristi Kline
President, MWPCA

Hello to all certified operators and members and friends of Montana WPCA:

This will be a very active year for WPCF and our Montana section. The federation is addressing two big items; membership and fund raising for the new WPCF headquarters building that is to be completed in July.

Campaign '86 is the name of the membership drive that has been given high priority by WPCF President Jerry Schwartz. In the Montana section, we are organizing the membership committee to involve the entire state. Rod James of Butte and Diane Davison of Helena will co-chair the committee. Dick Pedersen of the Water Quality Bureau will be the Professional Wastewater Operations Division contact person. The state will be divided into 7 or 8 regions with a MWPCA member in each region that will work with Dick in contacting surrounding municipalities and city governments and encouraging them to join. If anyone has any questions, contact Dick at 444-2406 and he can give you more details.

Each member association is being asked to help in raising money for the WPCF headquarters building. The Montana WPCA has set a goal of \$5,800 to be raised over a three year period. Past President Deanna Anderson of Butte is chairing this committee and is organizing some fund raising activities for next year's convention in Butte. The money will be added to the nationwide fund which many municipalities, private companies, individuals, and member associations have contributed in order to reach the desired goal of \$1,500,000 for the new office building. If anyone has any suggestions for fund raising or would like to serve on the committee, contact Deanna Anderson at 496-4108.

Perhaps you noticed in the April 1986 issue of Highlights, that Montana was in the spotlight in an article which focused on the talented women from various educational and professional backgrounds who are association officers. Deanna Anderson was interviewed about her past year as President of MWPCA. Deanna has been very active in MWPCA and mentioned in her interview "I would like to see our industry become more professional especially in the state's rural areas." Deanna is currently finishing her master's degree in Industrial Hygiene. Keep up the good work Deanna!

This year I plan to continue toward the goal of redefining officer roles and improving communication in our organization. Another area we need to bring into perspective is public education. The future of all water and wastewater issues will depend on us as WPCA members to get the information to the public. People will not support issues that they don't understand or do not have any knowledge of. We need all the "wastewater professionals"--operators, city managers, engineers, educators and manufacturer representatives to join talents and skills to make our state one that is informed and supportive of the water quality projects and issues we face in the future. I encourage you to get involved in MWPCA by serving on the various committees. You can help to make the committee active and get projects accomplished. We need your ideas and energy!!!!

To kick off the Operator's school in Bozeman this year, the board members of MWPCA and MAWWA are planning a wine and cheese social night for September 29 at 7:00 p.m. in the Strand Union Building of the MSU campus. This will be an informal get together to meet with the board members and discuss any information, problems or ideas you would like to see MWPCA and MAWWA address. Make sure to come and join us.

Drinking Water Amendments Signed

By: Jim Melstad, Water Quality Bureau

In May, the amended 1986 version of the Safe Drinking Water Act (SDWA) was passed by the House and Senate easily and on June 19, the President signed the amended act. The amendments to the Act are many and are summarized as follows:

1) New Standards For Public Water Supplies

The amended act requires EPA to establish maximum contaminant levels (MCL's) for nine volatile organic carbon chemicals (VOC's). These will be carcinogenic and/or toxic organic chemicals like benzene and vinyl chloride. Water supplies serving 10,000 or more people must sample for these chemicals within one year of the date of the regulation change (scheduled for January, 1987). Water supplies serving 3,300-10,000 people must sample within two years and water supplies serving less than 3,300 must sample within four years. Public water supplies will be required to meet the MCL's for these nine contaminants. Also, EPA is required to develop MCL's for 74 other contaminants within three years. The additional 74 will include most of the contaminants that EPA has already set MCL's for, like arsenic, lead and the pesticides. Some of the existing MCL's are scheduled for revision. In case this doesn't sound like enough monitoring, EPA is also required to develop monitoring requirements within 18 months for additional unregulated contaminants. It is not proposed that these additional contaminants be regulated as MCL's at this time, however.

Finally, EPA must develop criteria by 1988 that will be used to determine which surface water supplies must filter their water. By 1990, EPA must also develop criteria that will be used to determine which groundwater supplies will have to continuously disinfect their water. It is expected that states having primacy over the SDWA law and regulations (like Montana) will have some flexibility in interpreting how to enforce these criteria.

2) Increased Enforcement Authority

The amended SDWA gives EPA clearer and more powerful authority against violators. For instance, civil and criminal penalty limits are increased to \$25,000 and \$50,000 per day of violation, respectively. EPA must enforce violations whenever states choose not to take appropriate actions.

3) Groundwater Protection

Groundwater protection seems to be an important issue at present. Amendments to the act reflect this and are summarized as follows:

a) Sole Source Aquifer Demonstration Program

This program authorizes funding for the establishment of demonstration programs to protect "critical aquifer areas". These critical aquifer areas would be aquifers that are of critical importance and concern to a public water supply.

The amended act requires the primacy states to develop programs to protect areas surrounding public water supply wells. Partial funding is to be provided to the states to develop the programs within three years.

EPA will develop rules within 18 months for monitoring the injection of wastes below drinking water sources.

The amended act prohibits the use of lead solders, lead flux and lead pipes in new installations and in repairs of existing systems. Public water systems will be required to notify users within two years of any potential lead contamination sources.

The amended act allows EPA to treat Indian tribes as states in granting authority to them to administer the SDWA.

a) Federal authority is given to prosecute in cases of tampering with public water supplies.

b) Procedures for public notification of water system violations were revised. Notice of serious violation must be given within 14 days.

c) Federal authority is revised to include intervention in high risk contamination incidents and to require polluters to provide alternative supplies.

If you have any questions about how the act may affect your water supply, please call the Water Quality Bureau at 444-2406.

By: Lyle Meeks, Committee Chairman

The HSAWWA/MWPCA Joint Government Affairs Committee is responsible for developing programs to initiate, evaluate and respond to legislative and other regulatory matters directly affecting water and wastewater utilities. The effectiveness of the committee is directly related to each member's active involvement in government at all levels.

The committee's immediate activities are:

1. To improve communications with other members concerning legislative activity.
2. To strengthen the Associations' response to government initiatives.

3. To develop support for the Association's positions, and to develop lobbying "clout".
4. To educate the public concerning the role of AWWA and WPCF and the problems facing utilities.

Methods of accomplishing the above may be very time consuming. For this reason, the committee is interested in keeping the entire membership of both associations actively involved in the above objectives. Each association member can become involved by contacting one of the committee members and discuss building a telephone network that is "set-up" and in place during the legislative session, so that widespread support may be given to particular legislative actions. If you are interested in becoming a part of this network, in joining AWWA's Congressional Contact Program, or in planning future committee activities, please contact:

Lyle Meeks (Chairman) at 453-5478

The committee anticipates meeting by phone and letter to lay the framework for future activities.

Remember, if you don't let your voice be heard before legislation passes, you cannot rightfully complain about having to live with its effects!

AWWA Chairman's Message

BY: Mike Patterson

I hope all of you have had a good summer! I enjoyed my vacation best of all.

Welcome new members! AWWA membership has continued to grow all summer long.

Many of our committees and officers have been very busy this past spring and summer. As CEU's (Continuing Education Units) now become mandatory, our Education Committee will be playing an important role in helping inform and educate operators throughout the state. They already have good seminars lined up for the near future and I hope that many of you will plan on attending these. The Historical Committee would like to ask for any old photos, programs, etc. that you are willing to part with. If you have something of historical value, please contact Tim Berry in Helena. The Officers of AWWA/WPCA have been occupied with planning some functions for the Operators' School in Bozeman during the last week of September. There will be a water main tapping contest and we hope that there will be a lot of entries as it promises to be exciting. A Wine/Beer/Cheese party hosted by the officers will be held in the Strand Union Building of Montana State University at 7:00 p.m. on September 29. Hope all of you can attend!

I would like to take the opportunity to thank all of our hard working committee chairman and officers for the productive spring and summer. I hope to see you at the Operators' School in Bozeman or at the conference in Butte!

Mechanical Seals Versus Packing

By: Jim Duke - Montana Seals and Packing

One of the biggest issues facing water and wastewater plant managers today is cost effectiveness. Many pieces of sophisticated equipment have been installed to enhance operator control. Computers have been used at many locations to automate operations locally and remotely to reduce operational costs. With all this effort, one thing never fails to puzzle me. Only 12% of the pumps used in these systems are mechanically sealed and the balance are still using packing.

I've heard most of the reasons for not switching to mechanical seals. None are valid and most seem to be predicated on a lack of knowledge regarding selection, installation and operation. This article will attempt to eliminate some preconceived notions concerning mechanical seals and provide useful information regarding their selection and usage.

Today's mechanical seal requires less technique than was previously necessary for installation and operation. Any adjustments are done from outside the pump and the impellers and bearings can be adjusted without upsetting the seal. As for reliability, only through the use of mechanical seals has industry been able to handle some of the most sophisticated chemicals ever known. With regards to availability, cartridge seals are an off-the-shelf item from a supplier.

Probably the biggest argument for mechanical seals has to do with energy savings. One of the most effective ways to prove that a packed pump motor draws more current than a mechanical seal pump motor, is to measure the power wires of each with a clamp-on amp meter. Nothing has to be disassembled or disconnected; just clamp the meter on the wires at the control box. The current difference between the two operating systems will be between 500 milliamps and 1.5 amps per leg; the packed system having the greater current flow. Since power (watts) is equal to the current multiplied by the voltage, the kilowatt hours used can be computed over a one-year period. Figuring the cost per kilowatt/hour will show from \$800 to \$1,200 per year saved on a sealed system and \$800 will buy a fine cartridge mounted mechanical seal. This is a considerable savings and equipment damage caused by packing to sleeves, shafts, bearings, etc. has not been discussed. If you don't think these parts are big business, then why are so many people involved in their sale?

Remember that a properly selected mechanical seal does not need continual adjustments like packing does. Packing a pump is an art not a science and because of this, everyone packs a pump differently. Mechanical seals can only be installed one way. Seals don't leak; packing has to leak or heat problems are generated that will destroy the packing and sleeve. By eliminating pump leakage, bearing life can be increased and corrosive damage to the pump pedestal and surrounding equipment is eliminated. Just think of the housekeeping cost saved if a pump isn't leaking!

Someone once said to me "Well, one thing's for sure; when a seal leaks, I've got real problems!" This was true some years ago when the mechanical seal industry was bent on pushing the old rubber bellows concept. Most of the time these seals were difficult to install and incorrect installation generally led to a ruptured bellows when least expected. When a rubber

bellows splits, it allows a deluge of product spill and the only option was to shut down the pump. In today's technology, the rubber bellows has been replaced by O-rings than can handle all types of products, acid to caustic and temperatures from -65°F to 500°F . If an O-ring should leak, or seal faces develop a crack, the seal doesn't leak any worse than a packed pump. With the new double cartridge seals, a spare seal can be installed at the same time the original seal is installed and the product should never leak out of the pump.

Even if seals are the best thing coming down the pike, please don't run out and buy one until you look over the marketplace. Like any other business, there are some real bombs out there and some real bananas selling seals. Let's take a look at what you need to know before you plunk down your bucks.

Cartridge mounted means that all the components needed to make a seal in the pump are contained in one housing. Nothing else is needed. Component seal arrangements require serious attention to location and setting, and generally add to installation error problems. Almost every pump I can think of, from shaft sizes of 3/4 inch and up, are candidates for cartridge seals. There are some exceptions, but even they can be modified and the modification in almost all instances, will enhance the run time of the system.

An O-ring mounted seal means that the seal uses an O-ring to seal against the shaft or sleeve. It is very important that the O-ring touching the equipment is static. That means that the O-ring does not move when the pump is operated. Any O-ring or other secondary sealing device that is allowed to move on a sleeve or shaft, can lead to problems of premature seal failure when the O-ring hangs-up, and sleeve or shaft damage when the O-ring does move. Either way, you lose!

O-ring selection is a simple task today, compared to days gone by. It used to be that a Viton O-ring had to be put in a seal, if a low pH product was going to be pumped and an EPR (ethylene propylene rubber) O-ring in a seal to pump a high pH product. Today there is an O-ring that will handle acids or caustics and temperatures from -65°F to 500°F , and doesn't cost any more than a good grade of Viton. Also, the seal doesn't have to be torn down. This new material is a tetrafluoroethylene-propylene copolymer (AFLAS), and any seal manufacturer can supply it. Just don't let him charge extra for it.

Anyone in the mechanical seal industry will agree that a hydraulically balanced cartridge seal that is O-ring mounted will out last any other type by a serious margin. Hydraulic balance in this case means that the seal can withstand pressure and vacuum fluctuations from 29 inches of mercury (suction) to 400 psi in the stuffing box without causing any damage to the seal. Balanced seals (hydraulic) run cooler, are more forgiving of improper N.P.S.H. and worn equipment, and can outlast unbalanced seals two to one. Who makes hydraulically balanced seals? Everyone I know in the business does. Some seal manufacturers consider this feature an add on and charge more. Don't fall for that gimmick. Choose a seal with built-in balance.

Probably the best seal design in the industry over the years has been a stationary design seal. Stationary means that there are no rotating springs in the seal. Rotating springs in a mechanical seal can lead to the faces of the seal not maintaining parallelism under those times when system is operating in it's non-optimum margins. Seals of stationary design can take pump speeds over 5000 rpm, with absolute face parallelism. Any stationary design seal can take misalignment in a pump of over .025 of an inch on a one-inch shaft or sleeve and the capability to handle misalignment gets better as the shaft or sleeve size gets larger. Most seals with rotating springs will only handle about .005 to .007 of an inch of misalignment per inch of sleeve or shaft size.

Selecting the face combinations for seals used to be a big headache. Today the seal people that are serious about business, are offering face combinations of pure carbon and silicon carbide as a standard item. Silicon carbide is not sensitive to thermal shock in any temperature range and it is harder and more stable than most other materials used. The combination of silicon carbide and tungsten carbide makes for the hardest and coolest running face combinations that can be put in a slurry application (sewage, river water, etc.).

If any of this information has convinced you that mechanical seals are better than packing, it is probably because you realize that you need a break from the mess and man-hours that pump packing costs. There has never been a better time to investigate the mechanical seal market, and now you can make some informed decisions about what you need in a seal to handle your particular application.

One word of caution. I don't know of a pump manufacturer or civil engineering group that is knowledgeable in the application of mechanical seals. Most often they will equip a pump with the least expensive seal to meet the bid unless the type of seal is specified. Even then the seal may cost more than from a local seal distributor. Bring your pump in with stainless steel sleeves or shafts and install your own seal. If this violates any pump supplier warranties, then go ahead and use packing until you have accepted the system and then switch.

Remember, as with packing, the pumping system needs to be up to specification to get maximum performance from packing or seals. So take a few minutes and evaluate the system for proper pump to motor alignment. When you get a chance, attend one of many seal or packing schools offered by suppliers in your area.

Career Opportunity

We are seeking ambitious, aggressive project managers to join one of the fastest growing contract Operations and Maintenance firms in the country. Professional Services Group, Inc., is committed to providing an atmosphere that is conducive to the professional growth and development of all our employees.

The size and type of our plants vary, therefore, ranges of experience levels are approximate. Generally, successful candidates will have strong management capabilities, strong administrative skills, (budget preparation, cost estimating, purchasing and cost control), good communication skills, appropriate certification, and a willingness to relocate.

We have openings now. We invite you to investigate these exciting and satisfying career opportunities.

Send resume (including salary history and geographical preference) to:

Mr. Michael D. Nelson
Vice President, Operations
Professional Services Group
Rydal Executive Plaza
Suite 330
Rydal and Susquehanna Roads
Rydal, PA 19046

Equal Opportunity Employer

Belonging to MWPCA Brings Benefits

The Montana Water Pollution Control Association (MWPCA) is one of 67 associations which comprise the Water Pollution Control Federation (WPCF)

Membership in WPCF brings with it a great number of benefits. Most visible among these is a subscription to the Journal Water Pollution Control Federation and the Federation's newsletter, Highlights or Operations Forum, depending upon membership type. But there are many other advantages to joining WPCF. Members receive substantial discounts on most WPCF publications and conference registration. They are eligible to serve on WPCF committees and task groups, and receive first-hand the benefits of technological breakthroughs in the field. The five categories of membership in the WPCF/MWPCA are:

1. **Active/General Members:** The members of this group make up the largest category of the WPCF membership. They are people involved in many different aspects of wastewater treatment and include municipal officials, superintendents and operators of pollution control facilities, professional engineers, chemists, bacteriologists, biologists, researchers, teachers, and state and federal pollution control officials. In addition to the \$45 per year Federation dues, the Montana member association dues are \$5 per year. Active members receive the WPCF Journal and the newsletter Highlights.
2. **Professional Wastewater Operations Division Members:** Individuals involved in the daily on-site operation and maintenance of treatment plants, collection systems, or laboratories are eligible for membership in the PWOD. Members receive Operations Forum, WPCF's magazine for wastewater professionals. Dues for qualified operators are \$15 annually, plus Montana member association dues of \$5 per year. An add-on subscription to the Journal and Highlights is available for \$40.
3. **Student Members:** Student members are active members of the WPCF who are currently enrolled as regular students in a college or university and who spend at least one-half of their time on academic course work, or its equivalent. Dues to the Federation are \$15 per year. In addition there are member association dues of \$2 per year. Student members receive the WPCF Journal and the newsletter Highlights.
4. **Corporate Members:** This membership category includes public or private corporations (in part or in whole), governmental boards, districts or commissions, or other corporate bodies and organizations. In addition to the \$160 per year Federation dues, corporate members are also responsible for the member association's dues of \$5 per year. Corporate members receive the WPCF Journal, Operations Forum and the newsletter Highlights.
5. **Dual Member:** This membership category allows members of other WPCF Associations who do business with, or are involved with, the Montana Water Pollution control industry to join the MWPCA. This allows out-of-state water pollution control professionals to further their contacts with the Montana water pollution control community. Membership dues are \$5 per year. Dual members receive the MWPCA newsletter Big Sky Clearwater.

Application for Membership

All Categories

WATER POLLUTION CONTROL FEDERATION

2626 Pennsylvania Avenue N.W.
Washington, D.C. 20037
(202) 337-2500

MONTANA WATER POLLUTION CONTROL ASSOCIATION

c/o Ray Armstrong
HKM & Associates
P. O. Box 31313
Billings, Montana 59107
(406) 245-6354

Use this application to become a member of the Montana Water Pollution Control Association and the Water Pollution Control Federation.

Both organizations are not-for-profit educational associations dedicated to the development and dissemination of information concerning the nature, collection, treatment, and disposal of wastewater.

Different categories of membership receive different benefits — among them, publications such as the *Journal WPCF*, *Highlights* and the new publication the *Operations Forum*.

There are two restricted categories of membership:

Student: You must be a current full time student (for Member Associations offering Student Membership).

**PWOD* — The member of the Federation qualifying for the Professional Wastewater Operations Division (PWOD) must be actively employed by the responsible operating entity on the facility site on a day-to-day basis in the operation and maintenance of wastewater collection facilities, wastewater treatment facilities or wastewater laboratories provided for such treatment facilities.

EMPLOYER/WORK

- 11OT—Local/Regional Government or Agency
- 13OT—State/Interstate Government or Agency
- 16OT—Federal Government or Agency
- 21OT—Consulting Firm (Engineering/Other)
- 25OT—Wastewater Equipment/Material
Manufacturer/Supplier
- 27OT—Industry
- 28OT—Construction Contractor
- 31OT—Educational Institution
- 61OT—Other (Specify) _____

EDUCATION

- 1—Less than High School
- 2—Training Courses, Short school
- 3—High School
- 4—Attended College
- 5—Completed Junior College
- 6—Bachelor's Degree
- 7—Advanced Degree

Instructions for Completing this Application

- Please fill in your name and address.
- Check the appropriate boxes in the MEMBERSHIP/ADD-ON BENEFITS CHART below (see *Membership Categories* Insert for membership qualifications).
- Fill in the EMPLOYER/WORK and EDUCATION codes in the spaces below. (Select appropriate codes from the list on the opposite page.)
- Include your payment. Please make checks payable to the *Water Pollution Control Federation*.
- Send your completed application in the postage-paid return envelope, or mail to:
WPCF, Data Management • 2626 Pennsylvania Ave., N.W. • Washington, D.C. 20037

1. Name _____
Employer _____
Address _____
City/State/Zip _____
Telephone _____

2. MONTANA WATER POLLUTION CONTROL ASSOCIATION/WPCF MEMBERSHIP/ADD-ON BENEFITS CHART

MEMBER CATEGORIES:	Active/General	*Professional Operations (PWOD)	Student	Corporate
Check One	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DUES:				
Member Assoc.	\$5.00	\$5.00	\$2.00	\$5.00
WPCF	\$45.00	\$15.00	\$15.00	\$160.00
SUB-TOTAL	\$50.00	\$20.00	\$17.00	\$165.00
CHECK ADD-ON BENEFITS:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Journal</i>	Included	\$40.00	Included	Included
<i>Forum</i>	\$10.00	Included	\$10.00	Included
<i>Highlights</i>	Included	\$9.00	Included	Included
Total	\$ _____	\$ _____	\$ _____	\$ _____

3. Employer/Work Code ☐☐☐☐ Education ☐ Sponsored by _____

4. Bill me ☐ Amount enclosed \$ _____

THE DUES SHOWN ABOVE REFLECT CURRENT INFORMATION

Y9C

Y9D



AWWA Is Here For You

AWWA is composed of professionals, like yourself, who make a difference in water supply. If you are involved in any area of this field there is something here for you.

As a member you will receive up-to-date information on research, new technologies and new challenges for the drinking water industry. You'll hear of new products and supplies, and the experiences of your peers in dealing with the same problems faced by your system.

Here in Montana, we can sometimes feel out of touch with our own profession. The AWWA will help keep you informed.

****OPERATORS!** You can join as an Affiliate Member for only \$19.00 per year. Affiliate membership is exclusively for personnel of water utilities with fewer than 1000 services or for employees in a non-supervisory position in any utility.

Active membership is for water utility personnel, municipal officials, consultants, educators, etc. Annual dues are \$48.00.

Student membership is for enrolled college students. Annual dues are \$15.00.

For more information please contact:

Donna Howell
Cogswell Building, A206
Helena, MT 59620
444-2406

or

Clint Tinsley
414 E. Callender
Livingston, MT 59047
222-1142

The following are some of the services and benefits membership in AWWA brings you:

JOURNAL AWWA, the world's most valuable source of technical and management water supply data.*

MAINSTREAM, a monthly news publication packed with important features and news stories about activities and achievements of Association members throughout the world.

OPFLOW, the widely acclaimed and highly readable monthly publication that provides operators with ideas, services and useful how-to information.

TECHNICAL LIBRARY, a computerized data center that provides immediate access to worldwide sources of information on the water supply industry.

Education opportunities, including regularly scheduled seminars and workshops, education services and specially packaged education programs.

Group Insurance eligibility.

Low member rates on all AWWA standards, manuals, handbooks and other fine publications.

Free employment listings in Mainstream.

Free Membership in the AWWA section where you live or work, with opportunities to participate in all section activities.

10-35% Avis car rental discount.

Access to WATERNET, AWWA's data base of information about water supply and water treatment technology.

*Not to affiliate members.

INDIVIDUAL MEMBERSHIP APPLICATION



AMERICAN WATER WORKS ASSOCIATION

6666 West Quincy Avenue
Denver, Colorado 80235

Membership in AWWA is extremely rewarding for any individual, firm, or agency interested in the improvement of drinking water for people everywhere. There are endless opportunities to share information on technology, research, management, governmental affairs and other developments in the water supply field.

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AWWA USE ONLY

Complete this form and mail to AWWA today.

Please print

CHECK TYPE OF MEMBERSHIP

- | | Grade Code | Annual Dues |
|---|------------|-------------|
| <input type="checkbox"/> Active | 02 | \$48.00 |
| <input type="checkbox"/> Affiliate
(Strictly for operator-level personnel or employees of small utilities) | 06 | \$19.00 |
| <input type="checkbox"/> Student
(Must be enrolled and carrying at least 10 credit hours) | 14 | \$15.00 |

IMPORTANT

Affiliate applicants give number of customers your utility serves: _____

LAST NAME FIRST NAME (and middle initial)

MAILING ADDRESS

CITY STATE OR PROVINCE ZIP

AREA CODE TELEPHONE

TITLE

EMPLOYER'S NAME (IF NOT ALREADY IN MAILING ADDRESS)

APPLICANT'S SIGNATURE DATE

SIGNATURE OF AWWA MEMBER ENDORSING APPLICATION ENDORSER MEMBER NUMBER

PRINT LAST NAME OF ENDORSING MEMBER

ALL APPLICANTS COMPLETE THIS SECTION:

Circle the descriptions below that best describe YOU. The information is used in surveys of AWWA readership. Circle ONLY one in each group.

1. BUSINESS AND INDUSTRY

- A. Public Water Supply Utility—Municipally Owned
- B. Public Water Supply Utility—Investor Owned
- C. Governmental—Federal, State, Local
- O. Consultant
- E. Contractor
- F. Private Industrial Systems or Water Wholesaler
- G. Manufacturer of Equipment & Supplies including Representatives
- H. Distributors of Equipment & Supplies including Representatives
- I. Educational Institutions, Faculty and Students, Libraries, and Other Related Organizations
- J. Fully Retired
- K. Research Labs

2. JOB TITLE

- A. Executive—Gen'l Mgr., Commissioner, Board Member, City Mgr., Mayor, President, Vice President, Owner, Partner, Director, etc.
- B. Management—Division Head, Section Head, Dept. Head, Mgr., Chief Engineer, Comptroller, etc.
- C. Engineering/non-managerial—Civil Engr., Mech. Engr., Envir. Engr., Planning Mgr., Field Engr., Systems Designer, etc.
- D. Scientific/non-managerial—Chemist, Biologist, Biophysicist, Researcher, Analyst, etc.
- E. Purchasing—Purchasing Agent, Procurement Specialist, Buyer, etc.
- F. Operations—Foreman, Operator, Maintenance, Crewman, Service Rep., etc.
- G. Marketing & Sales/non-managerial—Mkt. Analyst, Mkt. Rep., Salesman, Sales Rep., etc.
- H. Other, describe _____

3. CHECK FIELD(s) SERVED

- 5 ☐ Water Supply Only
- 7 ☐ Wastewater Only
- 9 ☐ Both
- 3 ☐ Other

In some AWWA sections, a portion of the section allotment equal to 50 percent or more of the domestic subscription rate charged for the section periodical will be allocated toward a subscription to that periodical

PREPAYMENT OF ONE YEAR'S DUES REQUIRED:

- 1. If you ask to be billed, you will be billed. No other action on your application can be taken until payment is received.
- 2. An acknowledgment will be mailed to you. If you haven't heard from AWWA in one month

- a. contact your section's Secretary or Membership Committee Chairman. The application may have been held up there inadvertently;
- b. contact AWWA in Denver with an inquiry.

- ☐ Check Enclosed
- ☐ Please send bill to _____

- Charge to my
- ☐ MasterCard
- ☐ Visa
- Card No. _____

Dues allocated for each publication members receive: Journal \$20 • Mainstream \$6 • Opflow \$5 • Research Foundation \$3 •

**Water Quality Bureau
Department of Health and
Environmental Sciences
Room A-206, Cogswell Building
Helena, Montana 59620**

TO:

1,500 copies of this public document were published at an estimated cost of \$1.00 per copy, for a total cost of \$1,492.50 which includes \$1,300.00 for printing and \$192.50 for distribution.